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Dividends From Wood Research

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Explanation and Instructions

“Dividends From Wood Research” is a semiannual listing of recent publications resulting from wood utilization research at the Forest Products Laboratory (FPL). These publications are produced to encourage and facilitate application of Forest Service research. This issue lists publications received between July 1 and December 31, 1997.

Each publication listed in this brochure is available through at least one of the following sources.

Available from FPL (indicated by an order number before the title of the publication): Quantities limited. Circle the order number on the blank at the end of the brochure and mail or fax the blank to FPL.

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Available through libraries: Research publications are available through many public and university libraries in the United States and elsewhere. U.S. Government publications are also available through many Government Depository Libraries. Check with a major library near you to determine availability.

List of Categories

Publications are listed in this brochure within the following general categories:

- Decay Processes and Bioprocessing
- Durability
- General
- Papermaking and Paper Recycling
- Properties and Use of Wood, Composites, and Fiber Products
- Recycling of Wood Products
- Surface Chemistry
- Timber and Fiber Demand and Technology Assessment
- Wood Anatomy and Identification

Decay Processes and Bioprocessing

Proceedings of the 1997 Biological Sciences Symposium;
1997 October 19–23; San Francisco Marriott,
San Francisco, CA. Atlanta GA: TAPPI PRESS.

Characterization of UV Absorbing Products Released From Kraft Pulps by Xylanases

Davis, Mark; Rosin, Brian; Landucci, Lawrence L.;
Jeffries, Thomas W.
1997: 435–442.

**The Role of Manganese in Enhanced Lignin
Degradation by *Pleurotus ostreatus***
Kerem, Zohar; Hadar, Yitzhak
1997: 29–33.

**Extracellular, Degradation of Polyethers by the
Brown Rot Fungus *Gloeophyllum trabeum***
Kerem, Zohar, Bao, Wuli; Hammel, Kenneth E.
1997: 461–462.

**Ligninolytic Activities of the Biopulping Fungus
Ceriporiopsis subvermispora in Solid State Cultures**
Srebotnik, E.; Jensen, K.A., Jr.; Maijala, P.; Hammel, K.E.
1997: 493–496.

Fungal Delignification and Biomechanical Pulping of Wood

Akhtar, M.; Blanchette, Robert A.; Kirk, T. Kent
1997. Advances in Biochem. Eng./Biotech. 57: 160–195.

Corn Steep Liquor Lowers the Amount of Inoculum for Biopulping

Akhtar, Masood; Lentz, Michael J.; Blanchette, Robert A.;
Kirk, T. Kent
1997. Tappi J. 80(6): 161–164.

Cell Wall Alterations in Loblolly Pine Wood Decayed by the White-rot Fungus, *Ceriporiopsis subvermispora*

Blanchette, Robert A.; Krueger, Eugene W.; Haight, John E.; Akhtar, Masood; Akin, Danny E.
1997. J. Biotech. 53: 203–213.

Impact of Xylanase and Fungal Pretreatment on Alkali Solubility and Brightness of Dissolving Pulp

Christov, L.P.; Akhtar, M.; Prior, B.A.
1996. Holzforschung 50(6): 579–582.

Immunological Detection of Wood Decay Fungi—An Overview of Techniques Developed from 1986 to the Present

Clausen, Carol A.
1997. *Int. Biodeter. & Biodegrad.* 39(2-3): 133-143.

Bacterial Biodegradation of CCA-Treated Waste Wood

Cole, Flesia A.; Clausen, Carol A.
1996. In: *Proceedings, The use of recycled wood and paper in building applications. Proceedings No. 7286.* Madison, WI: Forest Products Society: 201-204.

Recent Advances on the Molecular Genetics of Ligninolytic Fungi

Cullen, Daniel.
1997. *J. Biotech.* 53: 273-289.

Mechanism of Brown-Rot Decay: Paradigm or Paradox

Green, Frederick III; Highley, Terry L.
1997. *Int. Biodeter. & Biodegrad.* 39(2-3): 113-124.

Targeted Inhibition of Wood Decay (Using Everything but the Kitchen Sink)

Green, Frederick III; Kuster, Thomas A.; Highley, Terry L.
1997 In: *Proceedings of the The International Research Group on Wood Preservation, 28th annual meeting; 1997 May 25-30; Vancouver, British Columbia, Canada. Sec. 1, Biology.*
The Research Group on Wood Preservation. Document IRG/WP/ 97-10203.

Protection of Southern Pine from Fungal Decay and Termite Damage with N,N-Naphthaloylhydroxylamine

Green, Frederick III; Kuster, Thomas A.; Ferge, Les;
Highley, Terry L.
1997. *Int. Biodeter. & Biodegrad.* 39(2-3): 103-111.

Detection of Increased Metal Cations After Wood Decay Using Chromeazurol-S

Green, Frederick III; Srinivasan, Usha; Miller, Regis B.
1997 In: *Proceedings of the The International Research Group on Wood Preservation; 28th annual meeting; 1997 May 25-30; Vancouver, British Columbia, Canada.* The Research Group on Wood Preservation. Document IRG/WP/ 97-20112.

Fungal Degradation of Lignin

Hammel, K.E.
1997. In: Cadisch, G.; Giller, K.E., eds. Chap. 2. *Driven by nature: plant litter quality and decomposition.* United Kingdom: CAB International: 33-45.

Nondestructive Elemental Analysis of Wood Biodeterioration Using Electron Paramagnetic Resonance and Synchrotron X-ray Fluorescence

Illman, B.L.; Bajt, S.
1997. *Int. Biodeter. & Biodegrad.* 39(2-3): 235-243.

The Role of Cations in the Biodegradation of Wood by the Brown Rot Fungi

Jellison, Jody; Connolly, Jon; Goodell, Barry; Doyle, Brian; Illman, Barbara; Fekete, Frank; Ostrofsky, Andrea
1997. *Int. Biodeter. & Biodegrad.* 39(2-3): 165-179.

Localization and Induction of Oxalate Decarboxylase in the Brown-Rot Wood Decay Fungus *Postia placenta*

Micales, Jessie A.
1997. *Int. Biodeter. & Biodegrad.* 39(2-3): 125-132.

The Decomposition of Forest Products in Landfills

Micales, J.A.; Skog, K.E.
1997. *Int. Biodeter. & Biodegrad.* 39(2-3): 145-158.

Binding of Pentachlorophenol to Humic Substances in Soil by the Action of White Rot Fungi

Rüttimann-Johnson, Carmen; Lamar, Richard T.
1997. *Soil Biol. Biochem.* 29(7): 1143-1148.

Diminished Respirative Growth and Enhanced Assimilative Sugar Uptake Result in Higher Specific Fermentation Rates by the Mutant *Pichia stipitis* FPL-061

Sreenath, Hassan K.; Jeffries, Thomas W.
1997. *Appl. Biochem. & Biotech.* 63-65: 109-116.

Xylitol Formation and Key Enzyme Activities in *Candida boidinii* Under Different Oxygen Transfer Rates

Vandeska, Eleonora; Kuzmanova, Slobodanka;
Jeffries, Thomas W.
1995. *J. Fermen. Bioeng.* 80(5): 513-516.

Xylitol Formation by *Candida boidinii* in Oxygen Limited Chemostat Culture

Winkelhausen, E.; Pittman, P.; Kuzmanova, S.; Jeffries, T.W.
1996. *Biotech. Letters.* 18(7): 753-758.

Regulation of Phosphotransferases in Glucose- and Xylose-Fermenting Yeasts

Yang, Vina W.; Jeffries, Thomas W.
1997. *Appl. Biochem. Biotech.* 63-65: 97-108.

Durability

Solutions of Diffusion Equation With Constant Diffusion and Surface Emission Coefficients

Liu, Jen Y.; Simpson, William T.
1997. *Drying Technol.* 15(10): 2459-2477.

Determination of Ylinen's Parameter for Parallel-Strand Lumber

Rammer, Douglas R.; Zahn, John J.
1997. *J. Struct. Eng.* 123(10): 1409-1414.

► 1. Effect of Air Velocity on the Drying Rate of Single Eastern White Pine Boards

Simpson, William T.
1997. *USDA Forest Serv. Res. Note FPL-RN-266.*

This report provides quantification of the effects of air velocity on drying rate of individual eastern white pine boards. An empirical equation correlating moisture content with time during drying was used to aid in the analysis.

An Optimization Technique to Determine Red Oak Surface and Internal Moisture Transfer Coefficients During Drying

Simpson, William T.; Liu, Jen Y.
1997. *Wood and Fiber Sci.* 29(4): 312-318.

Estimating Kiln Schedules for Tropical and Temperate Hardwoods Using Specific Gravity

Simpson, William T.; Verrill, Steve P.
1997. *Forest Prod. J.* 47(7/8): 64-68.

Preservative Treatment Evaluation With CCA and ACQ-B of Four Appalachian Wood Species for Use in Timber Transportation Structures

Slahor, Jeffrey J.; Hassler, Curt C.; DeGroot, Rodney C.; Gardner, Douglas J.
1997. *Forest Prod. J.* 47(9): 33-42.

Heat Release Rate of Wood-Plastic Composites

Stark, Nicole M.; White, Robert H.; Clemons, Craig M.
1997. *SAMPE J.* 33(5): 26-31.

Flammability of Christmas Trees and Other Vegetation

White, Robert H.; DeMars, Denise; Bishop, Mark
1997. In: *Proceedings, 24th international conference on fire safety; 1997 July 21-24; Columbus, Ohio.* Sissonville, WV: Product Safety Corporation: 99-110.

General

Proceedings of the 1997 Environmental Conference & Exhibit; 1997 May 5-7; Minneapolis Convention Center, Minneapolis, MN. Atlanta GA: TAPPI PRESS.

New Silvicultural Practices Under Ecosystem Management

Baubour, R. James; Tesch, Steven; Willits, Susan;
Fight, Roger; Gustafson, Richard; Kumar, Saket;
McNeel, Joseph; Mason, Andrew; Skog, Ken.
1997: 121-130. Book 1.

National Project on Wood Utilization Options for Ecosystem Management—An Interim Report

LeVan, Susan L.; Baubour, James R.; Clark, Alex;
Baumgras, John
1997: 117-119. Book 1.

Papermaking and Paper Recycling

Proceedings of the 1997 Environmental Conference & Exhibit; 1997 May 5-7; Minneapolis Convention Center, Minneapolis, MN. Atlanta GA: TAPPI PRESS.

New Approaches to Forest Sustainability

Abubakr, Said; Haney, Alan; Kilgore, Michael A.; Daub, Betsy; Chapman, Kim; Bloomquist, Eric.
1997: 477-478. Book 1.

Progress In Sustainable Forestry

Abubakr, Said; Lucier, Alan A.; Kernohan, Brian J.; Haufler, Jonathan B.; Ohms, Dave
1997: 607-608. Book 2.

Retention of Calcium Carbonate During Recycling:

Direct Loading Versus Fiber Loading
Klungness, John H.; Tan, Freya; Sykes, Marguerite S.; Aziz, Salman.
1997: 497-503. Book 1.

Utilization of Nontraditional Species

Myers, Gary C.; Barbour, R. Jamie; Abubakr, Said.
1997: 131-138. Book 1.

Beetle-Killed Spruce Utilization in the Kenai Peninsula

Scott, Garm M.; Bormett, David W.; Lowell, Eini
1997: 139-144. Book 1.

Proceedings of the 1997 Biological Sciences Symposium; 1997 October 19-23; San Francisco Marriott, San Francisco, CA. Atlanta GA: TAPPI PRESS.

Meeting Biological and Engineering Challenges During Scale-up of Biopulping

Akhtar, Masood; Scott, Gary M.; Lentz, Michael J.; Horn Eric G.; Swaney, Ross E.; Kirk, T. Kent; Shipley, David F.
1997: 35-39.

Engineering and Economic Feasibility of Large-Scale Biopulping Trials

Scott, Gary M.; Akhtar, Masood; Kirk, T. Kent; Swaney, Ross
1997: 427.

Photoyellowing of Thermomechanical Pulps: Looking Beyond α -Carbonyl and Ethylenic Groups as the Initiating Structures

Agarwal, Umesh P.; McSweeney, James D.
1997. *J. Wood Chem. Technol.* 17(1&2): 1-26.

A New Environmentally Benign Technology and Approach to Bleaching Kraft Pulp. Polyoxometalates for Selective Delignification and Waste Mineralization

Weinstock, Ira A.; Atalla, Rajai H.; Reiner, Richard S.; Moen, Mark A.; Hammel, Kenneth E.; Houtman, Carl J.; Hill, Craig L.
1996. *New J. Chem.* 20(2): 269-275.

Pulp Extrusion: A New Processing Method for Recycling Recovered Wastepaper and Papermill Sludge and its Application for Building Materials

Zauscher, Stefan; Scott, C. Tim
1996. In: *Proceedings, The use of recycled wood and paper in building applications.* Proceedings No. 7286. Madison, WI: Forest Products Society: 68-78.

Properties and Use of Wood, Composites, and Fiber Products

Proceedings of the 1997 Environmental Conference & Exhibit; 1997 May 5-7; Minneapolis Convention Center. Minneapolis, MN. Atlanta GA: TAPPI PRESS.

Mechanical Properties of Spaceboard Panels and Pallets Made From Recycled Lineboard Mill Sludge
Hunt, John F.; Jenkins, Don; Scott, C. Tim; Hovey, Kermit 1997: 481-488. Book 1.

Pulp Extrusion at Ultra-High Consistencies
Scott, C. Tim; Zauscher, Stefan 1997: 739-743. Book 2.

Effects of Two Fiber Treatments on Properties of Hemlock Hardboard

Chow, Poo; Bao, Zhaozhen; Youngquist, John A.; Rowell, Roger M.; Muehl, James H.; Krzysik, Andrzej, M. 1996. *Forest Prod. J.* 46(7/8): 62-66.

Expanding the Limits of Wood Polymer Composites: Studies Using Dynamic Mechanical Thermal Analysis

Elllis, W. Dale; Sanadi, Anand R. 1997. *In: Anderson, S.I.; Brondsted, P.; Liholt, H.; Lystrup, Aa.; Theinländer; Sorensen, B.F.; Toftegaard, H.* Polymeric composites—expanding the limits. *Proceedings, 18th Riso international symposium on materials science.* Roskilde, Denmark: Riso National Laboratory: 307-312.

Filters, Sorbents, and Geotextiles

English, Brent 1997. *In: Proceedings, Paper and composites from agro-based resources; 1997 July; Boca Raton, FL.* CRC Press: Lewis Publishers: 403-425. Chapter 13.

Wood Fiber-Reinforced Plastics in Construction

English, Brent 1996. *In: Proceedings, The use of recycled wood and paper in building applications.* *Proceedings No. 7286.* Madison, WI: Forest Products Society: 79-81.

Properties and Grading of Southern Pine Timbers

Green, David W.; Kretschmann, David E. 1997. *Forest Prod. J.* 47(9): 78-85.

Chemical Composition of Fibers

Han, James S.; Rowell, Jeffrey S. 1997. *In: Rowell, R.M.; Young, R.A.; Rowell, J.K.; comp., ed.* Paper and composites from agro-based resources. Boca Raton, FL: CRC Lewis Publishers: 83-134. Chap. 5.

► 2. Field Performance of Timber Bridges—13. Mohawk Canal Stress-Laminated Bridge

Hilbrich Lee, Paula D.; Lauderdale Xanthi 1997. *USDA Forest Serv. Res. Pap. FPL-RP-563.* 18 p.

This report describes the development, design, construction, and field performance of the Mohawk Canal bridge in Yuma County, Arizona. The bridge is a double-lane, single-span, stress-laminated deck approximately 6.4 m (21 ft) long and 10.4 m (34 ft) wide. The laminations are Combination 16F-V3 Douglas Fir, glued-laminated timber (glulam) beams.

► 3. Field Performance of Timber Bridges—14. Dean, Hibbsville, and Decatur Stress-Laminated Deck Bridges

Hilbrich Lee, Paula D.; Ritter, Michael A.; Golston, Steve; Hinds, Keith 1997. *USDA Forest Serv. Res. Pap. FPL-RP-564.* 21 p.

This report describes the development, design, construction, and performance of three eastern cottonwood stress-laminated deck bridges constructed in southern Iowa: the Dean and Hibbsville bridges in Appanoose County and the Decatur bridge in Decatur County.

Wheat Straw as a Reinforcing Filler in Plastic Composites

Johnson, Donna A.; Jacobson, Rod; Maclean, W. Dan. 1997. *In: Rowell, R.M.; Sanadi, A.R., eds.* *Proceedings of the 4th international conference on woodfiber-plastic composites.* Madison, WI: Forest Products Society: 200-205.

► 4. Mechanical Properties of Salvaged Dead Yellow-Cedar in Southeast Alaska—Phase I

McDonald, Kent A.; Hennon, Paul E.; Stevens, John H.; Green, David W. 1997. *USDA Forest Serv. Res. Pap. FPL-RP-565.* 9 p.

The primary objective of this study was to determine if mechanical properties of yellow-cedar snags vary with the length of time the snags have been standing dead. The expectation is that older snags would have less utility and possibly yield lower strength wood than younger snags. By identifying the year at which there is strength loss, salvage negotiations could include important contracting decisions and only useful snags would be harvested.

Natural Fibers in Resin Transfer Molded Composites

O'Dell, Jane L. 1997. *In: Rowell, R.M.; Sanadi, A.R., eds.* *Proceedings of the 4th international conference on woodfiber-plastic composites.* Madison, WI: Forest Products Society: 280-285.

Agro-Fiber Based Composites: Exploring the Limits

Rowell, Roger M. 1997. *In: Anderson, S.I.; Brondsted, P.; Liholt, H.; Lystrup, Aa.; Theinländer; Sorensen, B.F.; Toftegaard, H.* Polymeric composites—expanding the limits. *Proceedings, 18th Riso international symposium on materials science.* Roskilde, Denmark: Riso National Laboratory: 127-133.

Composites from Agri-Based Resources

Rowell, Roger M. 1996. *In: Falk, Robert H., ed.* *Proceedings, The use of recycled wood and paper in building applications.* *Proceedings No. 7286.* Madison, WI: Forest Products Society: 217-222.

Opportunities for Composites from Agro-Based Resources

Rowell, Roger M. 1997. *In: Rowell, R.M.; Young, R.A.; Rowell, J.K.; comp., ed.* Paper and composites from agro-based resources. Boca Raton, FL: CRC Lewis Publishers: 249-268. Chap. 7.

Potentials for Jute Based Composites

Rowell, Roger M. 1997. *In: Proceedings, Indian jute—Perspectives;* 1997 October 20-22; New Delhi, India: 84-89.

Utilization of Natural Fibers in Plastic Composites: Problems and Opportunities

Rowell, Roger M.; Sanadi, Anand R.; Caulfield, Daniel F.; Jacobson, Rodney E.
1997. *In: Leão, Alcides L.; Carvalho, Francisco X.; Frollini, Elisabete. Lignocellulosic-plastics composites. São Paulo, Brazil: Universidade de São Paulo Press: 23–52.*

Worldwide In-Ground Stake Test of Acetylated Composite Boards

Rowell, R.M.; Dawson, B.S.; Hadi, Y.S.; Nicholas, D.D.; Nilsson, T.; Plackett, D.V.; Simonson, R.; Westin, M.
1997. *In: Proceedings of the The International Research Group on Wood Preservation, 28th annual meeting; 1997 May 25–30; Whistler, Canada. Sec. 4, Processes. The Research Group on Wood Preservation. Document IRG/WP/ 97–40088.*

Agro-Fiber Thermoplastic Composites

Sanadi, Anand R.; Caulfield, Daniel F.; Jacobson, Rodney E.
1997. *In: Rowell, R.M.; Young, R.A.; Rowell, J.K.; comp., ed. Paper and composites from agro-based resources. Boca Raton, FL: CRC Lewis Publishers: 378–401. Chap. 12.*

Highly Filled Lignocellulosic Reinforced Thermoplastics: Effect of Interphase Modification

Sanadi, Anand R.; Feng, Daan; Caulfield, Daniel F.
1997. *In: Anderson, S.I.; Brondsted, P.; Liholt, H.; Lystrup, Aa.; Theinländer, Sorensen, B.F.; Toftegaard, H. Polymeric composites—expanding the limits. Proceedings, 18th Riso international symposium on materials science. Roskilde, Denmark: Riso National Laboratory: 465–470.*

Wood Fiber Reinforcement of Styrene-Maleic Anhydride Copolymers

Simonsen John; Jacobson, Rodney; Rowell, Roger
1997. *In: Rowell, R.M.; Sanadi, A.R., eds. Proceedings of the 4th international conference on woodfiber-plastic composites. Madison, WI: Forest Products Society: 215–220.*

Introduction

Soltis, Lawrence A.; Ritter, Michael.
1997. *In: Mechanical Connections in Wood Structures. Chap. 1. ASCE Manuals and Reports on Engineering Practice No. 84. New York, NY: American Society of Civil Engineers: 1–26.*

Bolts, Drift Bolts, and Pins

Soltis, Lawrence A.; Wilkinson, Thomas L.
1997. *In: Mechanical connections in wood structures. Chap. 4. ASCE manuals and reports on engineering practice No. 84. New York, NY: American Society of Civil Engineers: 127–145.*

Effects of Microstructural Heterogeneity in Cement Excelsior Board

Stahl, Douglas C.; Cramer, Steven M.; Geimer, Robert L.
1997. *Wood Fiber Sci. 29(4): 345–352.*

Linear and Nonlinear Material Effects on Postbuckling Strength of Corrugated Containers

Urbanik, Thomas J.
1997. *In: Perkins, Richard, ed. Mechanics of cellulosic materials: Proceedings, The 1997 joint ASME/ ASCE/ SES summer meeting; 1997 June 29–July 2; Evanston, Illinois. The American Society of Mechanical Engineers. AMD–Vol. 221, MD–Vol. 77: 93–99.*

Effects of Ammoniacal Copper Citrate Preservative Treatment and Redrying on Bending Properties of Two Grades of Southern Pine 2 by 4 Lumber

Winandy, Jerrold E.; LeBow, Stan T.
1997. *Forest Prod. J. 47(7/8): 91–99.*

Cement-Bonded Wood Composites as an Engineering Material

Wolfe, Ronald W.; Gjinolli, Agron
1996. *In: Proceedings, The use of recycled wood and paper in building applications. Proceedings No. 7286. Madison, WI: Forest Products Society: 84–91.*

Recycling of Wood Products

Fiberboard: An Option for Recycling Wood Treated with Waterborne Preservatives

Felton, Colin; DeGroot, Rodney C.
1996. *In: Proceedings, The use of recycled wood and paper in building applications. Proceedings No. 7286. Madison, WI: Forest Products Society: 212.*

Feasibility of Recycling Timber from Military Industrial Buildings

Lantz, Scott F.; Falk, Robert H.
1996. *In: Proceedings, The use of recycled wood and paper in building applications. Proceedings No. 7286. Madison, WI: Forest Products Society: 41–48.*

The Future of Recycled Material Usage in Building Applications: Summary of Conference Viewpoints

Laufenberg, Theodore.
1996. *In: Proceedings, The use of recycled wood and paper in building applications. Proceedings No. 7286. Madison, WI: Forest Products Society: 155–159.*

Fire Testing of Recycled Materials for Building Applications

White, Robert H.
1996. *In: Proceedings, The use of recycled wood and paper in building applications. Proceedings No. 7286. Madison, WI: Forest Products Society: 198–200.*

Surface Chemistry

Determination of the Acid-Base Characteristics of Lignocellulosic Surfaces by Inverse Gas Chromatography

Tshabalala, Mandla A.
1997. *Appl. Poly. Sci.* 65(5): 1013–1020.

Enhanced Adhesion of Melamine-Urea and Melamine Adhesives to CCA-Treated Southern Pine Lumber

Vick, Charles B.
1997. *Forest Prod. J.* 47(7/8): 83–87.

More Durable Epoxy Bonds to Wood With Hydroxymethylated Resorcinol Coupling Agent

Vick, Charles B.
1997. *Adhesives Age* 40(8): 24–29.

Why Exterior Finishes Fail

Williams, Sam; Knaebe, Mark; Feist, William
1997. *Fine Homebuilding*. (June/July): 61–65.

Timber and Fiber Demand and Technology Assessment

An Estimation of Opportunity Cost for Sustainable Ecosystems

Howard, James L.
1997. *In: Forests, biological diversity and the maintenance of the natural heritage: Protective and environmental functions of forests. Proc. 11th world forestry congress; 1997 October 13–22; Antalya, Turkey. Vol. 2:* 41–47.

Factors Influencing the Supply and Demand of OCC

Howard James L.
1997. *In: Abubakr, Said., ed. Recycling. Chap. 6. Old Corrugated Containers. TAPPI Press Anthology of Published Papers:* 467–474.

Resource Potential of Solid Wood Waste in the United States

McKeever, David B.
1996. *In: Proceedings, The use of recycled wood and paper in building applications. Proceedings No. 7286. Madison, WI: Forest Products Society:* 13–20.

Plywood Niche Narrows but Producers Still Have Ample Opportunities

Spelter, Henry
1997. *Panel World*. 38(5): 28–31.

▷ 5. Review of Wood-Based Panel Sector in United States and Canada

Spelter, Henery; McKeever, Dave; Durbak, Irene
1997. *USDA Forest Serv. Gen. Tech. Rep. FPL-GTR-99.* 45 p.

This paper reviews the evolution of the wood-based panels sector in the United States and Canada, focusing on capacity growth, manufacturing costs, markets, and trade for the veneered and nonveneered panel segments and their offshoots in engineered wood products.

A Recursive Linear Programming Analysis of the Future of the Pulp and Paper Industry in the United States: Changes in Supplies and Demands, and the Effects of Recycling

Zhang, Dali; Buongiorno, Joseph; Ince, Peter J.
1996. *Annals of Operations Res.* 68: 109–139.

Wood Anatomy and Identification

▷ 6. Softwoods of North America

Alden, Harry A.
1997. *USDA Gen. Tech. Rep. FPL-GTR-102.* 151 p.

This report describes 52 taxa of North American softwoods, which are organized alphabetically by genus. Descriptions include scientific name, trade name, distribution, tree characteristics, wood characteristics, and additional sources of information. Data were compiled from existing literature, mostly from research done at the U.S. Department of Agriculture, Forest Service, Forest Products Laboratory, Madison, Wisconsin.

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